

Abstract

Signal processing operations are performed in a digital communication system receiver on a sequence of received symbols, each representing a number of information bits. The symbols correspond to points in a given modulation constellation generated by applying a predetermined rotation, e.g., a 45° rotation, to an otherwise conventional modulation constellation, e.g., a QPSK constellation, a 16-QAM constellation, etc. The use of the rotated constellation allows certain signal processing operations, such as filtering, Least-Mean-Squares (LMS) estimation, and Maximum-Likelihood (ML) sequence detection via the Viterbi algorithm, to be performed without the need for multipliers. By eliminating or substantially reducing the number of required multiplication operations, the invention significantly reduces the complexity and delay associated with the corresponding signal processing circuitry. Advantageously, this reduction in complexity and delay is accomplished without the use of any approximation or other reduction in precision.